Dec. 27, 1955 B. W. FRY 2,728,434

COIN MECHANISM AND CHANGE MAKER EMBODYING SAID MECHANISM

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FIG. 1.

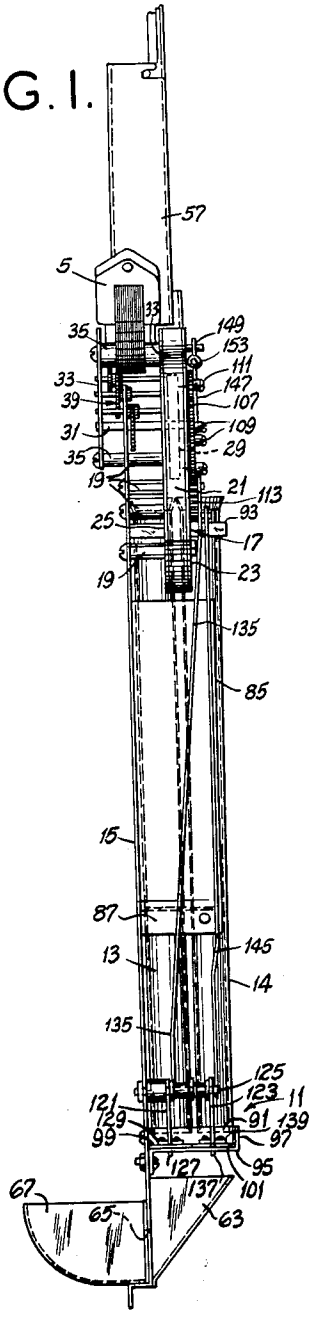


FIG. 2.

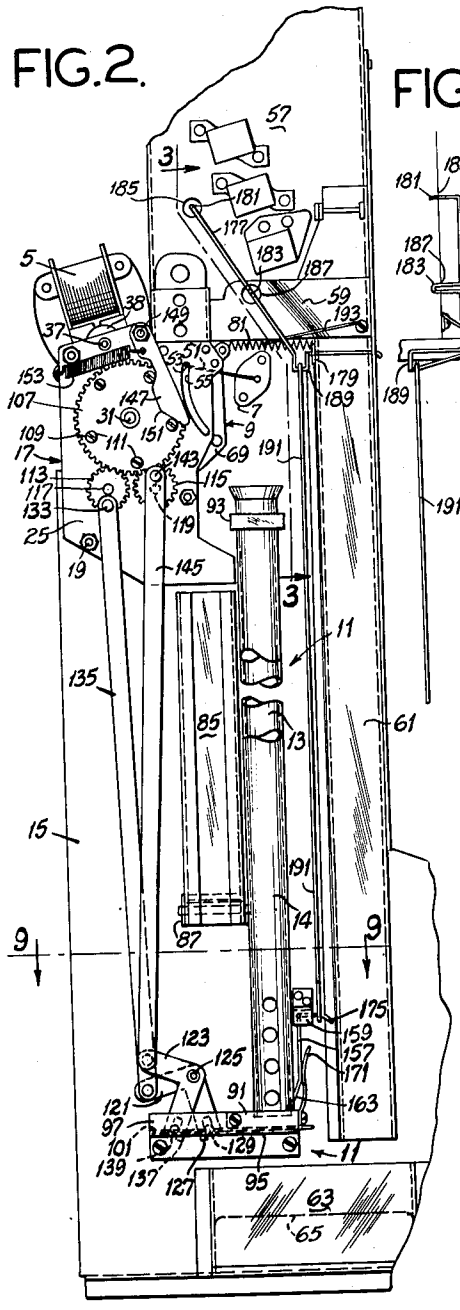
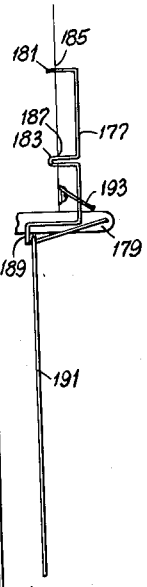


FIG. 3.



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FIG. 4.

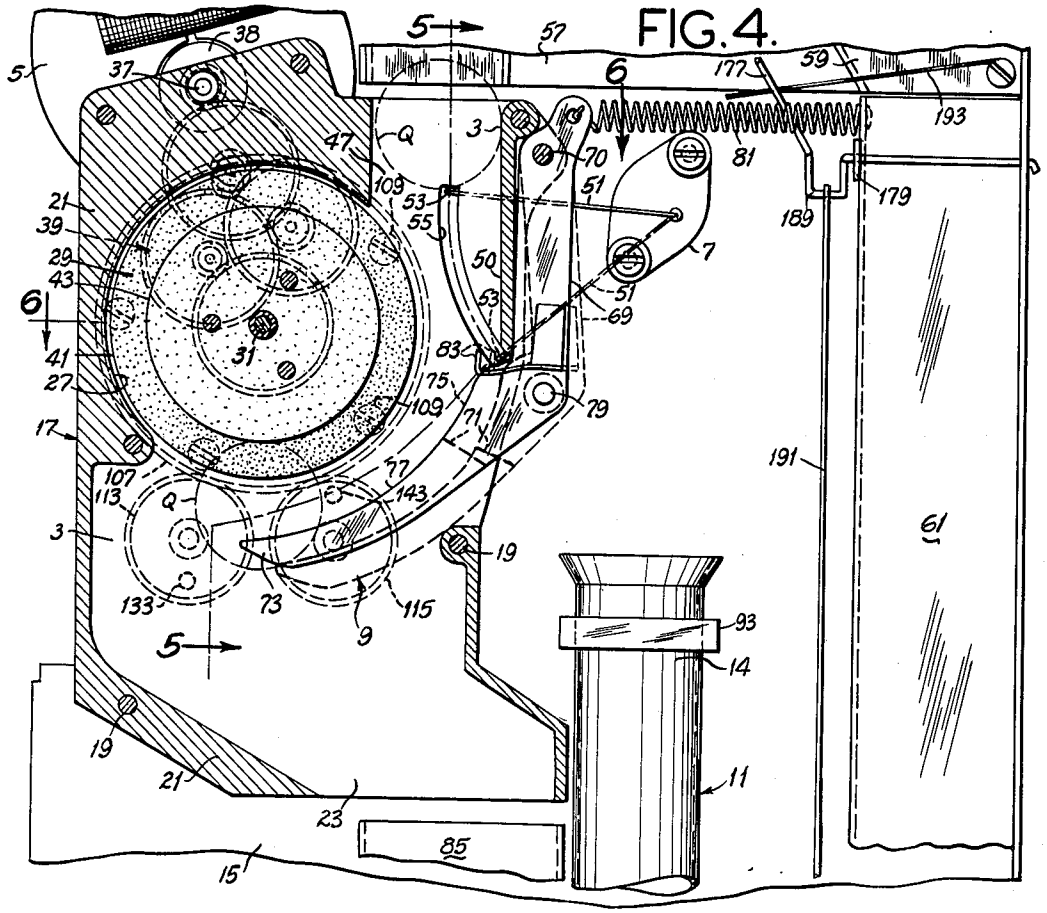



FIG. 5.

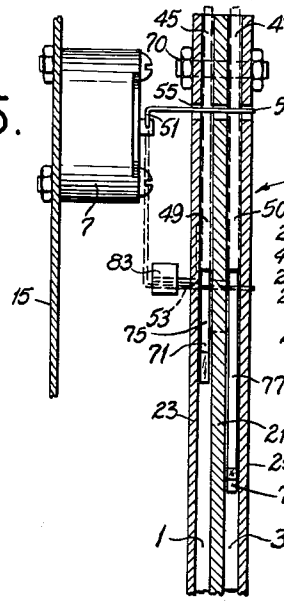
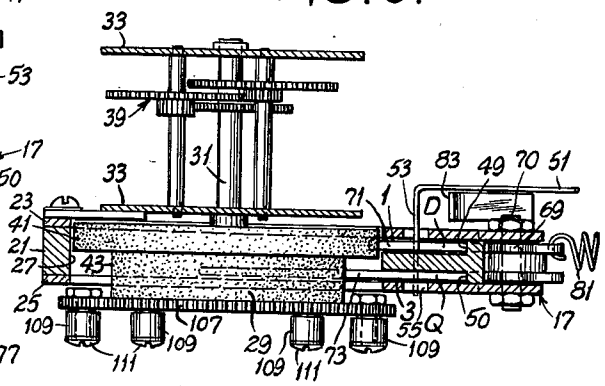



FIG. 6.




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FIG. 7.

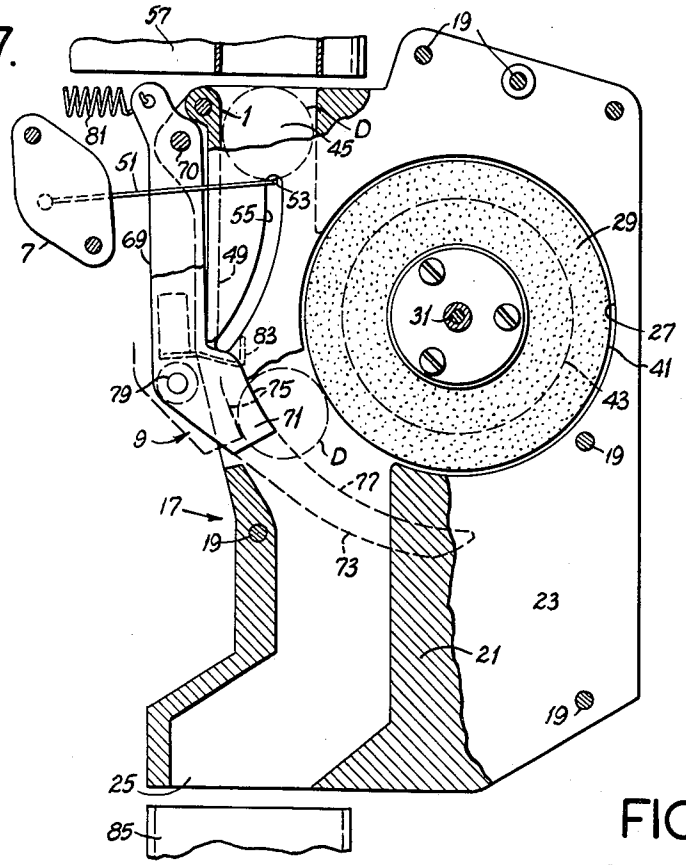



FIG. 8.

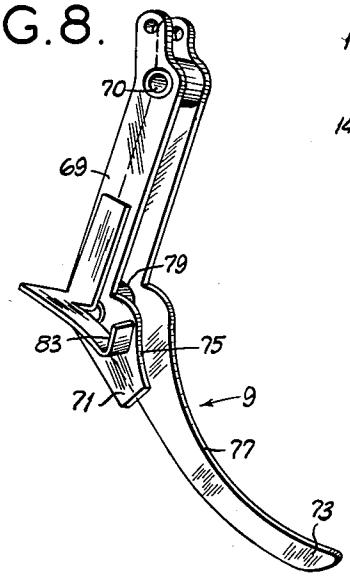
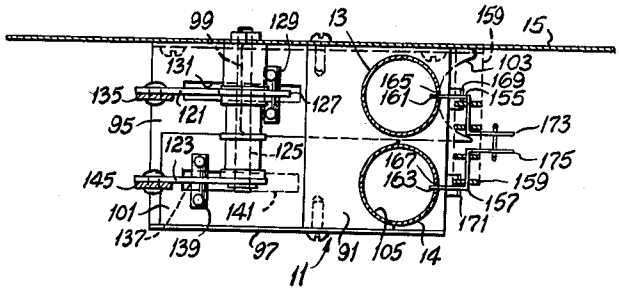



FIG. 9.




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COIN MECHANISM AND CHANGE MAKER EMBODYING SAID MECHANISM

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FIG. 10.

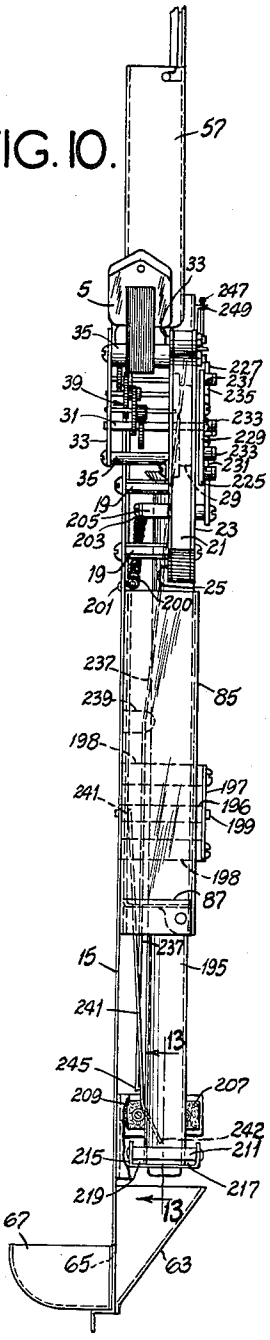



FIG. 11.

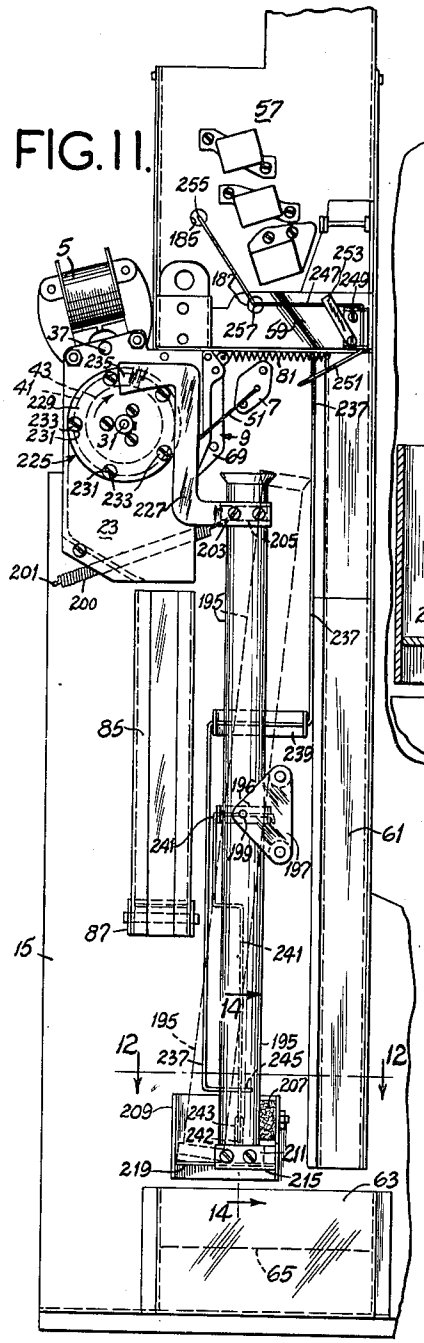



FIG. 12.

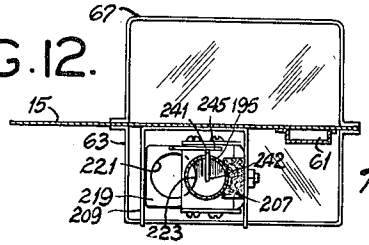



FIG. 13.

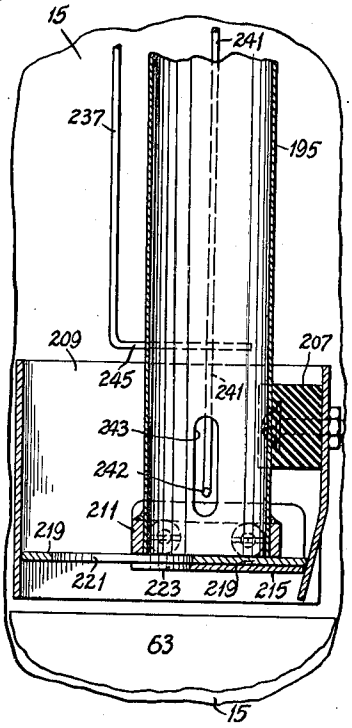
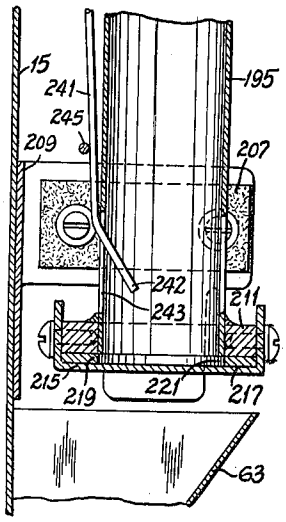



FIG. 14.




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United States Patent Office

2,728,434

Patented Dec. 27, 1955



2,728,434

# COIN MECHANISM AND CHANGE MAKER EMBODYING SAID MECHANISM

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Application December 7, 1950, Serial No. 199,699

12 Claims. (Cl. 194—10)

This invention relates to coin mechanisms and change makers embodying said mechanisms, and more particularly to mechanisms for coin-in-slot devices which are adapted to control operations in accordance with the number and/or denomination of coins inserted, and also more particularly to change makers utilizing such mechanisms.

Among the several objects of the invention may be noted the provision of an improved and simplified coin mechanism for coin-in-slot devices, such as change makers or vending machines, adapted reliably to control a variety of operations, such as a change-making operation, or a vending operation, or a total-amount-registering operation (registration of the total value of one or more coins inserted), in accordance with the number and/or denomination of coins inserted, and the provision of an improved simplified change maker incorporating the improved coin mechanism of the invention adapted, for example, automatically to issue nickels in change for dimes or quarters. In its broadest aspect, the coin mechanism of this invention comprises a first coin chute for coins of a first denomination, and a second coin chute for coins of a second denomination. Associated with these is an electric motor and a switch controlling the motor, and means actuated by a coin of the first denomination travelling in the first chute for holding the switch closed to operate the motor for a predetermined period of time, and actuated by a coin of the second denomination travelling in the second chute for holding the switch closed to operate the motor for a period of time substantially equal to the product of the first-mentioned period of time and the ratio of the monetary value of coins of the second denomination to the monetary value of coins of the first denomination. For example, the first coin chute may be for dimes and the second for quarters. A quarter travelling in the quarter chute will hold the switch closed for two and one-half times (the ratio of twenty-five cents to ten cents) as long as a dime travelling in the dime chute will hold the switch closed. As used in the change maker of this invention, the motor of the coin mechanism is employed to actuate a coin dispensing mechanism a number of times corresponding to the denomination of an inserted coin to dispense the proper number of coins of smaller value in change. For example, where the first coin chute is a dime slot and the second coin chute a quarter chute, and nickels are to be dispensed in change, upon insertion of a dime the motor will be energized such a length of time as to actuate the coin dispensing mechanism to dispense two nickels, and upon insertion of a quarter, the motor will be energized two and one-half times as long thereby to actuate the coin mechanism to dispense five nickels. Other features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.



In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated,

Fig. 1 is a view in end elevation of a change maker of this invention embodying a coin mechanism of this invention;

Fig. 2 is a side elevation of Fig. 1 as viewed from the right side of Fig. 1;

Fig. 3 is a fragmentary vertical section taken substantially on line 3—3 of Fig. 2;

Fig. 4 is an enlarged vertical fragmentary section taken generally in the plane of a quarter chute and looking to the left as viewed in Fig. 1;

Fig. 5 is an ideal section taken substantially on line 5—5 of Fig. 4;

Fig. 6 is an ideal section taken substantially on line 6—6 of Fig. 4;

Fig. 7 is a vertical section taken generally in the plane of a dime chute looking to the right as viewed in Fig. 1;

Fig. 8 is an enlarged perspective of a coin-actuated switch-operating latch member;

Fig. 9 is an enlarged horizontal section taken on line 9—9 of Fig. 2;

Fig. 10 is a view similar to Fig. 1 illustrating a modification in respect to the coin-dispensing mechanism;

Fig. 11 is a side elevation of Fig. 10 as viewed from the right side of Fig. 10;

Fig. 12 is a horizontal section taken on line 12—12 of Fig. 11;

Fig. 13 is an enlarged vertical section taken on line 13—13 of Fig. 10; and,

Fig. 14 is an enlarged vertical section taken on line 14—14 of Fig. 11.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Illustrated in the drawings and hereinafter described is an automatic change maker incorporating as a subcombination thereof the novel coin mechanism of this invention, the latter being useful per se in apparatus other than change makers for effecting operations other than change-making operations, as will be mentioned later following the ensuing detailed description. The change maker, as herein illustrated, is adapted to dispense United States five-cent coins, i. e., nickels, in change in response to insertion of either United States ten-cent or twenty-five cent coins, i. e., dimes and quarters, and the coin mechanism per se, as herein illustrated, is one that controls operations in response to insertion of dimes and quarters. However, it will be understood that the herein-disclosed principles are applicable to mechanism for handling United States coins of other denominations (for instance pennies or half dollars), or even to mechanisms for handling foreign coins, and, as applied to a change maker, for issuing coins of one denomination in change for coins of other denominations having values which are whole multiples of the value of a coin of said one denomination.

Referring to Figs. 1–9 of the drawings, a change maker embodying the invention is shown generally to comprise a first coin chute 1 for coins of one denomination, specifically dimes D, and a second coin chute 3 for coins of a second denomination, specifically quarters Q. It is also shown to comprise an electric motor 5 connected in a power circuit including a switch 7. Reference character 9 generally designates means actuated either by a dime travelling in the dime chute for holding the switch closed for a predetermined period of time (by way of example, about one second), and actuated by a quarter travelling in the quarter chute for holding the switch closed about two and one-half times that long (two and one-half being the ratio of the monetary value of quarters to the monetary value

of dimes). Reference character 11 generally designates a change dispenser comprising two magazines 13 and 14, for nickels, the dispenser being automatically actuated in response to insertion of a dime to dispense two nickels, and in response to insertion of a quarter to dispense five nickels.

More specifically, there is shown at 15 a vertical mechanism plate carrying the component parts of the change maker. A multiple coin chute assembly generally designated 17 is mounted parallel to and spaced from one face of the plate by means of spacers 19. The coin chute assembly 17 consists of a central relatively thick vertical plate 21 having recesses in its faces forming the dime and quarter chutes 1 and 3, with relatively thin cover plates 23 and 25 fastened in position over the faces of the central plate and covering the recesses in the latter. The coin chute assembly has a circular opening 27 in which is located a coin-driving means in the form of a stepped resilient coin-driving roller or wheel 29. This is fixed on a horizontal shaft 31 journalled in spaced bearing plates 33 held in spaced-apart relation by spacers 35, which together with plates 33 form a cage, the cage being carried by the coin chute assembly 17. The plates 33 carry the motor 5 which, as illustrated, is of a conventional type having a shaft 37 which is driven through a combination armature and magnetic clutch element indicated at 38, the clutch being energized whenever the motor is energized. The purpose in using a motor of this type is to insure quick stopping of the shaft 37 upon opening of the switch 7. The shaft 37 is geared to drive the wheel 29 through a speed-reducing gear train generally designated 39, the gears of the train being carried by shafts journalled in the bearing plates 33. The wheel is driven clockwise as viewed in Figs. 2 and 4.

The coin-driving wheel is formed of rubber or like suitable resilient material with two side-by-side steps 41 and 43 on two different diameters. The step 41, hereinafter referred to as the dime step, is located in the plane of the dime chute 1 and is adapted to engage a dime edgewise and drive it downward through the dime chute. Step 43, which is located in the plane of the quarter chute 3, is adapted to engage a quarter edgewise and drive it downward through the quarter chute 3. The dime and quarter chutes 1 and 3 have upper vertical entrance or inlet portions designated 45 and 47, respectively, which are disposed side-by-side, and which are so located with respect to the coin-driving wheel that a dime dropping through the inlet 45 of the dime chute will be wedged between the dime step 41 and the narrow vertical wall 49 of the dime chute lying across the dime chute from the step 41, and a quarter dropping through the inlet 47 of the quarter chute will be wedged between the quarter step 43 and the narrow vertical wall 50 of the quarter chute lying across the quarter chute from the step 43. Walls 49 and 50 are coextensive, being formed by integral ridges remaining on plate 21 after the coin-chute forming recesses have been milled.

A dime dropping through the inlet 45 of the dime chute, or a quarter dropping through the inlet 47 of the quarter chute, actuates a coin-actuated switch-operating lever 51. This lever extends from the switch into the space between the coin chute assembly 17 and the mechanism plate 15 and has a finger 53 at its free end which extends forward into an arcuate slot 55 cut in the coin chute assembly, i. e., cut in all three of plates 21, 23 and 25. The finger 53 is long enough to extend transversely across both the dime and quarter chutes 1 and 3. The lever 51 is adapted to close the contacts of switch 7 when swung downward from its generally horizontal retracted circuit-breaking position illustrated in solid lines in Fig. 4 by either a dime or a quarter dropping downward in the respective chute inlet 45 or 47. Lever 51 is normally biased to its retracted position (which is determined by engagement of the finger 53 with the upper end of the arcuate slot 55) by spring means within the switch casing, the spring bias being light enough readily to be overcome by the weight of a dime bearing on the finger 53. The switch 7 and the pivotal axis of the lever 51 are so positioned that the lever may swing downward to the dotted line circuit-making position illustrated in Fig. 4 wherein the finger 53 is in a retracted, chute-clearing position at the lower end of the slot 55 to allow a coin to travel on by the finger. The arcuate slot 55 is cut on an arc centered in the pivotal axis of the lever 51, and extends downward far enough and curves so that its lower end is just below the lower edges of chute walls 49 and 50. The arrangement is such that whenever a coin, either a dime or a quarter, is inserted, the lever 51 is swung down to close the switch 7, thereby energizing the motor 5 to drive the coin-driving wheel 29.



A coin selector 57 of known type such as disclosed in my U. S. Patent 2,292,628, is mounted on the plate 15 above the multiple coin chute assembly with its coin outlets above the upper and inlet ends of the dime and quarter chutes. Coins deposited in the change maker drop into the inlet of the coin selector. They then travel through the latter, which functions in a known manner to feed dimes into the dime chute, quarters into the quarter chute, and to eject any slugs or coins of improper denomination through a slug outlet 59 so that they are not fed into the dime or quarter chutes. Slugs or coins ejected through the slug outlet drop through a vertical chute 61 and into a receiver 63 located at the lower end of the plate 15 which delivers them through an opening 65 in plate 15 to a chute 67 on the other side of plate 15 for return to the customer.

The means generally designated 9 actuated by a dime travelling in the dime chute for holding the switch 7 closed for a predetermined period of time, and actuated by a quarter travelling in the quarter chute for holding the switch 7 closed for two and one-half times the period of time that a dime holds the switch closed, comprises a latch member or lever 69 pivoted to swing on a horizontal pivot 70 parallel to the axis of the wheel 29 and located adjacent the upper right corner of the coin chute assembly as viewed in Fig. 4. The lever 69 extends down from the pivot on the outside of the coin chute assembly and, at its lower end, has a shoe 71, hereinafter referred to as its dime shoe, which extends into the dime chute 1 through a slot below the lower edge of the wall 49 and below the lower end of the slot 55, the shoe 71 being opposed to the dime step 41 for the wheel 29. The lever 69 also has a shoe 73, hereinafter referred to as its quarter shoe, extending into the quarter chute 3 alongside the dime shoe 71 through a slot below the lower edge of the wall 50, the shoe 73 being opposed to the quarter step 43 of the wheel 29. The quarter shoe 73 projects considerably further into the quarter chute 3 than the dime shoe 71 projects into the dime chute. The shoes 71 and 73 have curved upper edges 75 and 77, respectively, facing the steps 41 and 43 of the wheel 29, for engagement by coins being driven by the wheel.

As illustrated, the lever 69 consists of two blades, one of which is shaped to have the dime shoe 71 and the other of which is shaped to have the quarter shoe 73, the blades being riveted together at 79 and also at the pivot 70, with spacers therebetween to hold them spaced apart a distance corresponding to the spacing of the dime chute 1 and the quarter chute 3. The lever 69 is biased by a spring 81 to swing clockwise on its pivot 70 as viewed in Fig. 4 so that shoes 71 and 73 are biased to swing toward the wheel 29. It is adapted to be swung in the opposite direction against the bias of the spring 81 by any coin being driven along by the wheel 29. A dime being driven along by the wheel engages the dime shoe 71 to move this shoe outward away from the wheel, and a quarter being driven along by the wheel 29 engages the shoe 73 to move this shoe outward away from the wheel. When a dime

rides off the end of the shoe 71 or a quarter rides off the end of the shoe 73, the spring 81 returns the lever 69 and the shoes 71 and 73 to their normal released position illustrated in solid lines in Fig. 4, wherein the spacing of dime step 41 and dime shoe 71 is less than the diameter of a dime, and the spacing of quarter step 43 and quarter shoe 73 is less than the diameter of a quarter. The lever 69 carries a latch hook 83 adapted for engagement with the finger 53 of the lever 51 when the lever 51 is brought to its lower dotted line circuit-making position illustrated in Fig. 4 and when the lever 69 is brought to its dotted line latching position illustrated in Fig. 4. The hook 83 extends from the lever 69 into the space between the coin chute assembly 17 and the plate 15.

The above-described arrangement is such that as a dime drops through the inlet 45 of the dime chute 1, it engages the finger 53 and swings the lever 51 downward to close the switch 7. This completes the circuit for motor 5, and the latter is energized to drive the wheel 29, which rotates clockwise as viewed in Fig. 4, counterclockwise as viewed in Fig. 7. The wheel 29 is rotating by the time the dime, falling freely in the inlet 45 of the dime chute 1, comes into engagement with the periphery of the dime step 41 of the wheel 29. This engagement occurs before the finger 53 reaches the lower end of the slot 55. As soon as the dime engages the step 41, it is driven downward in the dime chute 1 by the wheel 29 at a speed determined by the speed of the wheel and continues to swing the lever 51 until the latter reaches its dotted line position illustrated in Fig. 4. Thereupon the dime passes on by the finger 53. However, just before the finger 53 reaches the lower end of the arcuate slot 55, it engages the upper edges of the inner end portions of the shoes 71 and 73, and thereby swings the lever 69 clockwise as viewed in Fig. 7 to the point where the latch hook 83 engages behind the finger 53. The lever 69 is maintained in this switch-latching position by the dime riding on the edge 75 of shoe 71 until the dime rides off the end of the shoe 71, and despite the fact that the dime has passed on by the finger 53, the latter is latched in position at the lower end of the arcuate slot 55 by the latch hook 83 until the dime has ridden off the end of the shoe 71. As soon as this occurs, spring 81 returns the lever 69 to the solid line position illustrated in Fig. 4, whereupon the finger 53 is released and the lever 51 springs back upward under the spring bias in the switch 7. Thus, the switch 7 opens as soon as the dime has ridden off the end of the dime shoe 71, and this deenergizes and stops the motor. It will be seen that the motor has been energized from the time the dime, falling in the inlet 45 of the dime chute 1, swung lever 51 downward far enough to close the switch 7 to the instant when the dime rode off the end of the dime shoe 71.

Similarly, a quarter falling in the inlet 47 of the quarter chute 3 engages the finger 53 and this swings lever 51 downward thereby to close the switch 7 and energize the motor 5. With the motor energized, the wheel 29 is driven clockwise as viewed in Fig. 4. The quarter falls freely until it comes into engagement with the quarter step 43 of the wheel 29. Thereafter it is driven around by the wheel at a speed determined by the speed of the wheel. Engagement of the quarter with the quarter step 43 occurs before finger 53 is driven all the way downward in the arcuate slot 55. As the quarter is driven around by the wheel 29, it continues to move the finger 53 downward in the arcuate slot 55 until the finger reaches the lower end of the slot. However, before the finger 53 reaches the lower end of the slot 55, it engages the upper edges of the inner end portions of the shoes 71 and 73, and thereby swings the lever 69 outward against the bias of the spring 81. This brings the latch hook 83 into latching engagement with the finger 53. Although the quarter passes on by the finger 53 once the latter has reached the lower end of the slot 55, finger 53 is maintained



latched in the lower end of the slot until the quarter has ridden off the end of the quarter shoe 73, due to the lever 69 being held in its outer position by the quarter riding on the edge 77 of shoe 73. As soon as the quarter rides off the end of shoe 73, spring 81 returns the lever 69 to its released position, whereupon the finger 53 is released and lever 51 springs back upward. Thus, the switch 7 opens as soon as the quarter has ridden off the end of the quarter shoe 73, and this deenergizes and stops the motor. It will be seen that the motor has been energized from the instant the quarter, falling in the inlet 47 of the quarter chute 3, swung lever 51 downward far enough to close the switch 7 to the instant when the quarter rode off the end of shoe 73.

The length of the dime shoe 71 in the direction along the length of the dime chute is such in relation to the length of the quarter shoe 73, also in the direction along the length of the quarter chute, that the switch is held closed approximately two and one-half times as long by a quarter as by a dime. Thus, the motor is operated in response to insertion of a quarter for a period of time which is approximately two and one-half times the period for which it is operated in response to insertion of a dime. The result is that the wheel 29 turns two and one-half times as much in response to insertion of a quarter as it does in response to insertion of a dime. In the case of the apparatus herein illustrated, the timing affected by the shoes 71 and 73, taking into account the speed of the motor 5, the speed reduction effected by gear train 39, the diameter of wheel steps 41 and 43, and the diameter of dimes and quarters, is made such that wheel 29 rotates approximately two-fifths revolution in response to insertion of a dime and one full revolution in response to insertion of a quarter. Dimes riding off the dime shoe 71 and quarters riding off the quarter shoe 73 drop out of the respective coin chute 1 or 3 into a coin box 85. This box is supported on a bracket 87 secured to the plate 15 with its open upper end just under the exit ends of the coin chutes.

Each of the two nickel magazines 13 and 14 (these being identical) consists of a long tube having an internal diameter slightly greater than the diameter of a nickel adapted to receive a stack of nickels flatwise one on top of another. The magazines are of the gravity feed type, being mounted in vertical position on the plate 15 by means of a block 91 at their lower ends and a bracket 93 adjacent their upper ends. The lower ends of the magazines or tubes 13 and 14 fit in the upper ends of openings in the block 91. The two tubes are arranged closely side-by-side with their axes in a plane perpendicular to the plate 15, tube 13 being closely adjacent the plate. Fixed to the plate 15 below the bottom of the block 91 is a shelf 95. This is spaced below the bottom of the block a distance slightly greater than the thickness of a nickel, but less than twice the thickness of a nickel. The shelf has a flange 97 at its outer edge which extends up alongside the outer side of the block 91 (see Figs. 1 and 9). The bottom of the block, the shelf, the plate 15 and the flange 97 define a guideway for a pair of coin slides 99 and 101 slidably reciprocable on the shelf under the block. The slides 99 and 101 are arranged side-by-side on the shelf, the former being associated with tube 13 and the latter with tube 14. Their path of reciprocation is horizontal and parallel to the plate 15.

As shown in Fig. 9, the forward ends of slides 99 and 101 (their ends toward the tubes 13 and 14) are formed with coin notches 103 and 105. Each slide is adapted to slide forward from a retracted position, wherein it is clear of the respective coin opening in the block 91, to push the lowermost nickel of the stack of nickels received in the respective coin notch forward off the end of the shelf and into the receiver 63. Upon return of the slide to its retracted position, as soon as the notched forward end of the slide clears the coin

opening in the block 91, the stack drops to supply another nickel for being pushed off the shelf upon the next forward stroke of the slide. In Fig. 9, slide 101 is illustrated in retracted position and slide 99 in a forward position. The mouth of the receiver 63 is located below the forward end of the shelf, i. e., the end over which nickels are pushed off.

The slides 99 and 101 are actuated to dispense nickels by a mechanism which includes a spur gear 107 (Figs. 1, 2 and 6) fixed to the wheel 29 concentric therewith and having a series of rollers 109 mounted on bolts 111 spaced at equal intervals around the face of the gear. As shown, there are five such rollers spaced 72° apart. Two pinions 113 and 115 are mounted on shafts 117 and 119 carried by the coin chute assembly 17 in mesh with the gear 107. A pair of bell crank levers 121 and 123 are mounted for rocking movement side-by-side on a stud 125 extending horizontally outward from the plate 15 above the rearward ends of the slides 99 and 101. Lever 121 has one arm extending downward with a fork 127 at its lower end straddling a cross-pin 129 on slide 99. The slide and shelf are slotted at 131 (see Fig. 9) to accommodate the fork. Pinion 113 is provided with a crank pin 133. A link 135 connects the crank pin and the end of the other arm of lever 121, this arm extending in the direction away from the tube 13. Similarly, lever 123 has one arm extending downward with a fork 137 at its lower end straddling a cross-pin 139 on slide 101. This slide and the shelf are slotted at 141 (see Fig. 9) to accommodate the fork. Pinion 115 is provided with a crank pin 143. A link 145 connects the crank pin 143 and the end of the other arm of lever 123, this arm extending in the direction away from the tube 14.

Crank pins 133 and 143 on pinions 113 and 115 are 180° out of phase. Thus, when the link 145 is up, link 135 is down (see Fig. 2), and vice versa. When a link is up, the respective slide is in retracted position, and as it moves down it rocks the respective bell crank counterclockwise as viewed in Fig. 2 to move the respective slide forward. When a link moves upward it rocks the respective bell crank clockwise to retract the respective slide. The arrangement is such that upon each revolution of pinion 113, the slide 99 is moved forward and back through one complete stroke. Upon each revolution of pinion 115, the slide 101 is moved forward and back through one complete stroke. Slide 99 moves forward as slide 101 moves backward, and vice versa.

As herein illustrated, the gear ratio of gear 107 to the pinions 113 and 115 is such that each of the pinions rotates through one revolution upon rotation of gear 107 through ⅖ revolution. Thus, upon rotation of gear 107 through ⅖ revolution, each of slides 99 and 101 is moved through one complete stroke, one being first moved forward and then back, and the other being first moved back and then forward, to dispense one nickel from each of magazines 13 and 14. Upon rotation of gear 107 through one complete revolution, each of pinions 113 and 115 rotates through 2½ revolutions. This actuates the one of the slides that was initially in retracted position first forward, then back, again forward and back, and again forward to dispense three nickels from the respective magazine. It actuates the other slide, which was initially in forward position, first back, then forward, again back and forward, and again back, thereby dispensing two nickels from the respective magazine. Thus, since the wheel 29 and the gear 107 rotate through ⅖ revolution in response to insertion of a dime, and through one complete revolution in response to insertion of a quarter, two nickels are dispensed in change in response to insertion of a dime and five nickels are dispensed in change in response to insertion of a quarter.

The rollers 109 are provided for cooperation with a detent 147 adapted to prevent overrun of the gear 107 upon deenergization of the motor 5. The detent is pivoted at 149 on the coin chute assembly and has what amounts to a wide tapered tooth 151 adapted to fit between two rollers 109. It is biased toward engagement with the rollers by a spring 153. When the motor 5 is energized and the gear 107 is being driven, the rollers simply cam the detent outward and pass on by. Upon deenergization of the motor, however, the tooth 151 latches in between two rollers, and prevents overrun. The gear 107 is so phased with respect to the pinions that the detent latches in between two rollers upon each half revolution of the pinions between the upper and lower limits of the throws of the crank pins 133 and 143.

The apparatus also includes means operable in response to the depletion of the supply of nickels in either of magazines 13 or 14 to return any inserted coins to the customer, to prevent any possibility of a customer receiving no change at all or insufficient change for inserted coins. This means comprises a feeler 155 for magazine 13 and a feeler 157 for magazine 14. Each of feelers 155 and 157 consists of a length of rod pivoted for swinging movement on a horizontal axis toward and away from the respective magazines in a bracket 159. The feelers 155 and 157 hang down from the bracket and have fingers 161 and 163 at their lower ends bent toward the magazines 13 and 14 and reaching into the magazines through slots 165 and 167 at the lower ends of the magazines. The lower ends of the fingers are spaced above the shelf 95 a distance corresponding to the height of a stack of at least five nickels, i. e., a reserve sufficient to make change for a quarter, the coin of the largest denomination to be accepted by the change maker. The feelers 155 and 157 are biased toward the magazines by leaf springs 169 and 171, respectively, secured at their lower ends to block 91, and have lever arms 173 and 175 at their upper ends extending away from the magazines.

A lever 177, consisting of a length of rod, is pivoted for swinging movement on a horizontal axis in a bracket 179 at the upper end of the chute 61. Lever 177 is formed with coin-intercepting fingers at 181 and 183 which are adapted to reach into the coin chutes in the coin selector 57 through openings 185 and 187 when the lever is swung inward toward the coin selector. The lever 177 is also formed with a crank arm 189 (see Fig. 3), and a link 191 connects the crank arm 189 and the feeler lever arms 173 and 175 in such manner that if either feeler swings into its magazine, its lever arm pulls down the link 191 and thereby swings the lever 177 inward to the position where coin-intercepting fingers 181 and 183 are entered in coin-intercepting position in the openings 185 and 187. Lever 177 is biased outward by a spring 193, this spring being weaker than either of leaf springs 169 and 171.

As long as there are more than five nickels in each of maagzines 13 and 14, fingers 161 and 163 at the lower ends of the feelers 155 and 157 are held out of the magazines by the stacks of nickels. Under these conditions, the lever 177 is held in its outer position by spring 193, link 191 being raised. Thus, coin-intercepting fingers 181 and 183 are kept out of the coin chutes in the coin selector so that coins inserted therein may pass to the dime and quarter chutes 1 and 3. When the supply of nickels in either magazine is depleted below the reserve determined by the spacing of the lower ends of fingers 161 and 163 from the shelf 95, the feeler associated with the particular magazine is swung in by its respective leaf spring (169 or 171). The lever arm (173 or 175) of the particular feeler swings down and pulls down the link 191, thereby swinging lever 177 to its coin-intercepting position against the bias of spring 193 and holding it there. The leaf spring overcomes the bias of spring 193. Thus, as long as there are enough nickels in both magazines to make change for a quarter, coins inserted by a customer can pass on through the coin selector to the dime and quarter chutes 1 and 3. However, when the reserve in either magazine is depleted below the number of coins needed to make change for a quarter, the coin-intercepting fingers 181 and 183 are moved into position to return any inserted coins to the customer.

Operation is as follows:

Assume that a customer deposits a dime to obtain two nickels in change. The coin selector **57** deposits the inserted dime in the inlet **45** of the dime chute **1**. The dime, falling freely in the dime chute **1**, engages the finger **53** at the end of lever **51**, closes the switch **7** and thereby starts the motor **5**. The dime is then driven downward by the coin-driving wheel **29**, the dime being wedged in edgewise between the dime step **41** of the wheel and the dime shoe **71**, with the result that the latch member or lever **69** is held outward against the bias of spring **81** in position for latching engagement of its latch hook **83** with the finger **53** at the end of the switch-operating lever **51** until the dime rides off the end of the dime shoe **71**. Thereupon, the lever **69** is released and swings back to its released position under the bias of spring **81** to release the lever **51**, thereby opening the switch **7** and deenergizing the motor **5**. The motor **5** is operated for a time interval such as to drive the coin-driving wheel **29** and the gear **107** through two-fifths of a revolution. This actuates the nickel dispensing mechanism to dispense two nickels in change as fully described above.

Similarly, assuming that a quarter is deposited by the customer to obtain five nickels in change, the quarter is deposited in the inlet **47** of the quarter chute **3** by the coin selector **57**. In falling freely through the quarter inlet **47**, it engages finger **53** and swings the lever **51** downward to close the switch **7**. This initiates operation of the motor **5** to drive the coin-driving wheel **29** and the gear **107**. The quarter is driven downward in the quarter chute by the coin-driving wheel **29**, being wedged edgewise between the quarter step **43** of the coin-driving wheel and the quarter shoe **73**. The latch member or lever **69** is thus maintained in its outer position against the bias of spring **81** for latching engagement of the latch hook **83** with the finger **53** on the end of the switch-operating lever **51** until the quarter has ridden off the end of the quarter shoe **73**. Thereupon, the lever **69** returns to its released position under the bias of the spring **81**, and hook **83** is removed from latching engagement with the finger **53** so that the switch-operating lever **51** springs back upward to open the switch **7**. This stops the motor **5**. The motor **5** is energized for such a period of time as to effect rotation of the coin-driving wheel **29** and the gear **107** through one complete revolution. Rotation of the gear **107** through one complete revolution actuates the nickel dispensing mechanism to dispense five nickels in change, as fully described above.

Figs. 10–14 illustrate a modification in respect to the coin-dispensing mechanism of the change maker, the coin mechanism per se being exactly the same as in Figs. 1–9. As shown, the coin-dispensing mechanism of Figs. 10–14 comprises one nickel magazine designated **195**. This is of the gravity feed type, consisting of a long tube adapted to receive a stack of nickels flatwise one on top of another. The magazine **195** is fixed in and extends through an opening in a rectangular block or collar **196** which is located about at the center of the length of the tube. This block or collar is pivotally mounted between the mechanism plate **15** and a bracket plate **197** spaced outward from plate **15** by spacers **198**, pivots **199** extending from the plates **15** and **197** into bearing openings in the sides of the collar **196**. This mounts the magazine **195** for swinging movement about a horizontal axis parallel to the axis of the wheel **29**. The magazine extends generally vertically for gravity feed of nickels, and its upper end is opened and flared to facilitate insertion of nickels therein. The magazine is biased to swing counterclockwise as viewed in Fig. 11 by a tension spring **200** connected at **201** to the plate **15** and at **203** to a rectangular block or collar **205** adjacent the upper end of the tube, the spring tending to hold the magazine in a retracted position in which the magazine is generally vertical determined by engagement of the lower end of the magazine with a resilient stop **207**. This stop is mounted on the inside of one side of a bracket **209** which is C-shaped in plan (see Fig. 12), and which has its base attached to the plate **15**, being located just above the receiver **63**.

The lower end of the tube **195** is fixed in an opening in a rectangular block **211**. A U-shaped member **215** has its sides fixed to those sides of the block **211** which are parallel to the plate **15** and its bottom spaced from the bottom of the block a distance somewhat greater than the thickness of one nickel but less than the thickness of two nickels. The member **215**, in conjunction with the bottom of the block **211**, defines a guideway **217** of rectangular cross-section, and the bottom of the member **215** forms a bottom for the magazine. A slide plate **219** is mounted in this guideway for sliding movement relative to the tube **195**, but is restrained from linear movement by the sides of the C-shaped bracket **209**, the length of the slide plate **219** corresponding to the spacing of the sides of the C-shaped bracket **209**. However, plate **219** can partake of the rocking movement of the tube **195**. It will be seen from Fig. 11 that as the tube **195** swings clockwise from vertical to an inclined position, the slide plate **219** angles from a horizontal to a slightly inclined position. The slide plate **219** has a circular opening **221** of such diameter as to accommodate a nickel therein located adjacent its left end as viewed in Figs. 11–13. At the left end of the bottom of the member **215** is a notch **223**, the outline of which is a chordal segment of the opening **221**.

In the vertical retracted position of the tube **195**, which is indicated in solid lines in Fig. 11, the slide plate **219** projects outward toward the left side of the lower end of the tube as shown in Figs. 11–13, the plate **219** being substantially horizontal, and the nickel opening **221** in the plate **219** is displaced from registry with the tube. The stack of nickels rests on the slide plate **219**. The notch **223** is in registry with the nickel opening **221**. When the tube **195** is swung clockwise on its pivot away from its retracted position to a position determined by engagement of the lower end of the tube with the left side of the C-shaped bracket **209**, this position being illustrated in dotted lines in Fig. 11, the tube comes into registry with the nickel opening **221** in the slide plate **219** (noting that the slide plate **219** does not move linearly, being restrained by the sides of the C-shaped bracket **209**), and the stack drops down a distance equal to the thickness of one nickel, the lowest nickel of the stack dropping into the nickel opening **221** in the slide plate **219**, the stack being held up by the bottom of the member **215**. Then when the tube **195** swings back to its retracted position, as soon as the bottom of the member **215** clears the nickel opening **221**, the nickel drops out and falls into the receiver **63**. However, the remainder of the stack is held up by slide plate **219**.

The magazine **195** is actuated to dispense nickels by a mechanism comprising a ratchet wheel **225** (substituted for the gear **107**) which rotates with the coin-driving wheel **29** and a pawl **227** which is fixed to the magazine at its upper end. The ratchet wheel **225** comprises a disc **229** fixed to the wheel **29** concentric therewith and having a series of rollers **231** like rollers **109** mounted on bolts **233** spaced at equal intervals around the disc. As shown, there are five such rollers spaced 72° apart. The pawl comprises a Z-shaped blade, the end of the lower arm of which is secured to the collar **205**. The upper arm of the blade reaches over the center of the disc for engagement of its end **235** by the rollers on the disc as they advance toward and pass by their position directly above the center of the disc. The arrangement is such that as the disc **229** rotates through one-fifth of a revolution, a roller **231** engages the end **235** of the pawl **227** to swing the magazine **195** clockwise against the bias of spring **200** to the point where the roller rides off the end **235** of the pawl, whereupon spring **200** returns the magazine to its at-rest vertical position. It

will thus be seen that the ratchet, which rotates with wheel **29** through two-fifths of a revolution in response to insertion of a dime, will effect two complete oscillations of the magazine in response to insertion of a dime, thereby dispensing two nickels in change for the dime, and, turning through a full revolution in response to insertion of a quarter, will effect five complete oscillations of the magazine in response to insertion of a quarter, thereby dispensing five nickels in change for the quarter.

The change maker of Figs. 10–14 further includes means operable in response to depletion of the supply of nickels in the nickel magazine **195** to return any inserted coins to the customer, if the reserve in the magazine is not sufficient to make change for a coin inserted. This means comprises a long lever **237** illustrated as being formed of a length of rod, which is pivoted intermediate its ends in a bracket **239** attached to the plate **15** for swinging movement on a horizontal axis parallel to the plate **15** above the pivot axis of the magazine. A feeler **241** consisting of a length of rod having its lower end bent to form a finger **242** is pivoted at its upper end in the block **196** for swinging movement on a horizontal axis parallel to the axis of the lever **237**. The feeler is pivoted in the block **196** to swing with the magazine. The finger **242** at the lower end of the feeler is adapted to reach into the magazine through a vertical slot **243** at the lower end of the magazine. The lower end of the finger **242** is spaced from the upper surface of the slide plate **219** a distance corresponding to the height of a stack of at least five nickels, i. e., a reserve sufficient to make change for a quarter, which is the coin of the largest denomination received by the change maker. It is preferred to maintain a reserve of somewhat more than five nickels, for example seven nickels. The lever **237** has a finger **245** at its lower end which extends behind the feeler **241**. A lever **247**, consisting of a length of rod, is pivoted for swinging movement on a vertical axis in a bracket **249** on the coin selector **57**. This lever **247** has an arm **251** below the bracket **249** engaging in front of the upper end of the lever **237**, being biased by a leaf spring **253** toward the lever **237**. Lever **247** has an upper arm formed with coin-intercepting fingers at **255** and **257** which are adapted to reach into the coin chutes in the coin selector through openings **185** and **187**. When these fingers **255** and **257** are in coin-intercepting position, they intercept coins travelling through the coin selector and deflect them to the slug outlet **59** for return to the customer.

The above described arrangement is such that as long as there is a sufficient reserve of nickels in the magazine **195**, i. e., at least five nickels to make change for a quarter, the finger **242** of feeler **241** is held out of the magazine by the stack of nickels. This holds the lever **237** in a position wherein it maintains the lever **247** swung outward to keep the coin-intercepting fingers **255** and **257** out of the coin chutes in the coin selector so that coins inserted therein may pass to the dime and quarter chutes **1** and **3**. The feeler **241** and levers **237** and **247** are held in such position against the bias of the leaf spring **253**. When the supply of nickels in the magazine **195** is depleted below a required reserve, the finger **242** may then swing into the magazine **195** through the slot **243**, thereby allowing the lever **237** to release the lever **247** for movement under the bias of spring **253** to a position wherein the coin-intercepting fingers **255** and **257** reach into the coin chutes in the coin selector. Thus, as long as there are enough nickels in the nickel magazine **195** to make change for a quarter, coins inserted by a customer can pass on through the coin selector to the dime and quarter chutes **1** and **3**. However, when the reserve in the nickel magazine **195** is depleted below the number of coins needed to make change for a quarter, the coin-intercepting fingers **255** and **257** are moved into position to return any inserted coins to the customer.

From the above, it will be observed that as regards either the change maker of Figs. 1–9 or the change maker of Figs. 10–14, coins of a first denomination (specifically nickels) are issued in change for coins of second and third denominations (specifically dimes and quarters), the coins of the second and third denominations having monetary values which are whole multiples (specifically two and five, respectively) of the value of a coin of the first denomination. In each case, the change maker comprises means holding a supply of coins of the first denomination (magazines **13** and **14** in the first species, and magazine **195** in the second), and coin-dispensing mechanism operable in cycles for dispensing a coin of the first denomination from the supply upon each cycle of operation. In the first species, a nickel is dispensed upon each cycle of operation of each of slides **99** and **101**. In the second, a nickel is dispensed upon each cycle of operation of the magazine **195** (each complete oscillation). In each case, the motor is operated in response to insertion of a coin of the second denomination (a dime) for such a period of time as to operate the coin-dispensing mechanism through a number of cycles (two) corresponding to the ratio (two) of value of coins of the second to the first denomination, and is operated in response to insertion of a coin of the third denomination (a quarter) for a different period of time such as to operate the coin-dispensing mechanism through a number of cycles (five) corresponding to the ratio (five) of the value of coins of the third to the first denomination.

It will be understood that the coin mechanism per se, apart from the change dispenser, is useful in itself for effecting operations other than change-making operations. For example, it might be used in conjunction with a vending machine to indicate the total value of coins inserted. This might be done by having the motor **5** drive a registering mechanism for registering the amount deposited. It will be seen that since the motor rotates for different time intervals in response to insertion of coins of different value, the interval being proportional to the value of the coin, successive insertion of coins will step the total registering mechanism forward the proper amount in response to insertion of each coin. The coin mechanism might also be used in conjunction with a vending machine to control the vending operation and also to make change at the same time. Utilizing the principles of the invention, an arrangement might be made, for example, to vend items selling for a nickel, operating in such manner that when a quarter is inserted, the vending machine will dispense one nickel item and also dispense four nickels in change. Other uses of the coin mechanism per se will be readily suggested.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Coin mechanism comprising a first coin chute for coins of a first denomination, a second coin chute for coins of a second denomination, an electric motor, a switch controlling energization of the motor, a coin driving wheel driven by the motor for driving a coin through a portion of its respective chute, a switch control member having a finger extending across both chutes for engagement by a coin travelling toward the coin driving wheel in either chute, said control member being movable between a circuit-breaking position wherein the finger is positioned for engagement by a coin in either chute, and a circuit-making position wherein the finger is clear of the chutes to allow a coin to travel by the

finger, the switch control member being biased to circuit-breaking position, a latch member for the switch control member having a first shoe extending into the first chute and a second shoe extending into the second chute, said shoes being opposed to the coin driving wheel and being of different lengths along the length of the chutes, said latch member being movable between a released position and a latching position and being biased to its released position, and being movable from its released position to latching position by any coin being driven by the coin driving wheel, the coin engaging the respective shoe and holding the latch member in its latching position against its bias until the coin rides off the end of the shoe, the latch member having a detent latchingly engaged with the finger when the finger is moved by a coin to its circuit-making chute-clearing position and the latch member is moved to its latching position.

2. Coin mechanism comprising a dime chute, a quarter chute, an electric motor, a switch controlling energization of the motor, a coin driving wheel driven by the motor for driving a dime or a quarter through a portion of its respective chute, a switch control member having a finger extending across both chutes for engagement by a dime or a quarter travelling toward the coin driving wheel in the respective chute, said control member being movable between a circuit breaking position wherein the finger is positioned for engagement by either a dime or a quarter in the respective chute and a circuit-making position wherein the finger is clear of the chutes to allow a dime or a quarter to travel by the finger, the switch control member being biased to circuit-breaking position, a latch member for the switch control member having a dime shoe extending into the dime chute and a quarter shoe extending into the quarter chute, said shoes being opposed to the coin driving wheel and the quarter shoe being longer along the length of the chutes than the dime shoe, said latch member being movable between a released position and a latching position and being biased to its released position, and being movable from its released position to latching position by a dime or a quarter being driven by the coin driving wheel, the coin engaging the respective shoe and holding the latch member in its latching position against its bias until the coin rides off the end of the shoe, the latch member having a detent latchingly engaged with the finger when the finger is moved by a dime or a quarter to its circuit-making chute-clearing position and the latch member is moved to its latching position.

3. A change maker for issuing coins of a first denomination in change for coins of second and third denominations of monetary values which are whole multiples of the value of a coin of said first denomination, comprising means holding a supply of coins of said first denomination, coin-dispensing mechanism operable in cycles for dispensing a coin of said first denomination from said supply upon each cycle of operation, a first coin chute for coins of said second denomination, a second coin chute for coins of said third denomination, an electric motor for driving said coin-dispensing mechanism, a switch controlling energization of the motor, means actuated by a coin of said second denomination travelling in said first chute for holding the switch closed to operate the motor for a period of time such as to drive the coin-dispensing mechanism through a number of cycles corresponding to the ratio of value of coins of said second denomination to coins of said first denomination, and actuated by a coin of said third denomination travelling in said second chute for holding the switch closed to operate the motor for a different period of time such as to drive the coin-dispensing mechanism through a number of cycles corresponding to the ratio of value of coins of said third denomination to coins of said first denomination.

4. A change maker for issuing nickels in change for dimes or quarters, comprising means holding a supply of nickels, coin-dispensing mechanism operable in cycles for dispensing a nickel from said supply upon each cycle of operation, a dime chute, a quarter chute, an electric motor for driving said coin-dispensing mechanism, a switch controlling energization of the motor, means actuated by a dime travelling in the dime chute for holding the switch closed to operate the motor for a period of time such as to drive the coin-dispensing mechanism through two cycles to dispense two nickels, and actuated by a quarter travelling in the quarter chute for holding the switch closed to operate the motor for a period of time approximately two and one-half times as long to drive the coin-dispensing mechanism through five cycles to dispense five nickels.

5. A change maker for issuing coins of a first denomination in change for coins of second and third denominations of monetary values which are whole multiples of the value of a coin of said first denomination, comprising means holding a supply of coins of said first denomination, coin-dispensing mechanism operable in cycles for dispensing a coin of said first denomination from said supply upon each cycle of operation, a first coin chute for coins of said second denomination, a second coin chute for coins of said third denomination, means for positively driving a coin in either chute along a portion of its respective chute, an electric motor for operating both said coin-driving means and said coin-dispensing mechanism, a switch controlling energization of the motor, means actuated by a coin of said second denomination being driven in said first chute for holding the switch closed to operate the motor for a period of time such as to operate the coin-dispensing mechanism through a number of cycles corresponding to the ratio of value of coins of said second denomination to coins of said first denomination, and actuated by a coin of said third denomination being driven in said second chute for holding the switch closed to operate the motor for a different period of time such as to operate the coin-dispensing mechanism through a number of cycles corresponding to the ratio of value of coins of said third denomination to coins of said first denomination.

6. A change maker as set forth in claim 5 wherein the means actuated by coins of said second and third denomination comprises a first member engageable by a coin of said second denomination being driven in said first chute and a second member engageable by a coin of said third denomination being driven in said second chute, said members being of different length along the length of the respective chutes corresponding to the two different periods of time.

7. A change maker for issuing coins of a first denomination in change for coins of second and third denominations of monetary values which are whole multiples of the value of a coin of said first denomination, comprising means holding a supply of coins of said first denomination, coin-dispensing mechanism operable in cycles for dispensing a coin of said first denomination from said supply upon each cycle of operation, a first coin chute for coins of said second denomination, a second coin chute for coins of said third denomination, an electric motor, a switch controlling energization of the motor, a coin driving wheel driven by the motor for driving a coin through a portion of its respective chute and for operating said coin-dispensing mechanism, a switch control member having a finger extending across both chutes for engagement by a coin travelling toward the coin driving wheel in either chute, said control member being movable between a circuit-breaking position wherein the finger is positioned for engagement by a coin in either chute and a circuit-making position wherein the finger is clear of the chutes to allow a coin to travel by the finger, the switch control member being biased to circuit-breaking position, a latch member for the switch control member having a first shoe extending into the first chute and a second shoe extending into the second chute, said shoes being opposed to the coin-driving wheel and being of different lengths along the length of the chutes, said latch

member being movable between a released position and a latching position and being biased to its released position, and being movable from its released position to latching position by any coin being driven by the coin driving wheel, the coin engaging the respective shoe and holding the latch member in its latching position against its bias until the coin rides off the end of the shoe, the latch member having a detent latchingly engaged with the finger when the finger is moved by a coin to its circuit-making chute-clearing position and the latch member is moved to its latching position, the difference in length of said shoes being such that a coin of said second denomination holds the latch member in latching position for a period of time such as to operate the coin-dispensing mechanism through a number of cycles corresponding to the ratio of the value of coins of said second denomination to coins of said first denomination, and a coin of said third denomination holds the latch member in latching position for a period of time such as to operate the coin-dispensing mechanism through a number of cycles corresponding to the ratio of the value of coins of said third denomination to coins of said first denomination.

8. A change maker as set forth in claim 7 wherein said coin-dispensing mechanism comprises a pair of gravity-feed magazines for coins of said first denomination, and coin-dispensing slides, one for each magazine, driven from the coin driving wheel.

9. A change maker as set forth in claim 8 wherein said coin-dispensing slides are driven from the coin driving wheel by crank mechanisms with the cranks of said mechanisms 180° out of phase.

10. A change maker as set forth in claim 7 wherein said coin-dispensing mechanism comprises a gravity-feed magazine for coins of said first denomination mounted for swinging movement, means for dispensing a coin from the magazine upon an oscillation thereof, and means for oscillating the magazine from the coin driving wheel.

11. Coin mechanism comprising a first coin chute for coins of a first denomination; a second coin chute for coins of a second denomination; an electric motor; means driven by the motor for engaging and positively driving a coin along a portion of the respective chute; a switch controlling energization of the motor; a control member for the switch biased toward a circuit-breaking position in which it is engageable by a coin travelling toward said coin-driving means in either chute and being movable against its bias to a circuit-making position in which it is clear of the chutes; and means for holding the switch control member in its said circuit-making position for a first predetermined period of time when moved thereto by a coin of the first denomination, and for holding it in circuit-making position for a second predetermined period of time approximately equal to the product of the first period of time and the ratio of the monetary values of coins of said second and first denominations when moved thereto by a coin of the second denomination, comprising a first member engageable by a coin of the first denomination as it travels out of engagement with the switch control member and into engagement with the coin-driving means, and a second member engageable by a coin of the second denomination as it travels out of engagement with the switch control member and into engagement with the coin-driving means, said members being of different length along the length of the respective chutes corresponding to the two different periods of time.

12. Coin mechanism comprising a dime chute; a quarter chute; an electric motor; means driven by the motor for engaging and positively driving a dime or a quarter along a portion of the respective chute; a switch controlling energization of the motor, a control member for the switch biased toward a circuit-breaking position in which it is engageable by either a dime or a quarter travelling toward said coin-driving means in the respective chute and being movable against its bias to a circuit-making position in which it is clear of the chutes; and means for holding the switch control member in its said circuit-making position for a first predetermined period of time when moved thereto by a dime, and for holding it in circuit-making position for a second predetermined period of time approximately two and one-half times the first period when moved thereto by a quarter, comprising a first member engageable by a dime as it travels out of engagement with the switch control member and into engagement with the coin-driving means, and a second member engageable by a quarter as it travels out of engagement with the switch control member and into engagement with the coin-driving means, said members being of different length along the length of the respective chutes corresponding to the two different periods of time.

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|---|---|---|
| 509,181 | Richmond | Nov. 21, 1893 |
| 2,275,084 | Michaelson | Mar. 3, 1942 |
| 2,292,965 | Osborne | Aug. 11, 1942 |
| 2,323,255 | Sutherland | June 29, 1943 |
| 2,366,469 | Andres | Jan. 2, 1945 |
| 2,433,689 | Fry | Dec. 30, 1947 |
| 2,585,718 | Adams | Feb. 12, 1952 |